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WHAT IS CLAIMED IS:

2 1. A tool-less blade clamping apparatus for a reciprocating tool of the type which
3 has a reciprocating plunger with at least one radially oriented aperture and a blade receiving slot
4 at its forward end for receiving a blade of the type which has a shank portion with a hole and at
5 least one outwardly extending shoulder between the distal end of the shank and a blade portion,
6 the shank being configured to be inserted in the slot, the apparatus being configured to be
7 attached to the plunger and having an opening for receiving the blade shank therein and in the
8 slot, said apparatus comprising:

9 said apparatus having an unclamped position and a clamped position wherein the shank
10 portion of the blade can be inserted into said opening when it is in said unclamped position and
11 be securely retained therein when in said clamped position;

12 said apparatus being biased toward said clamped position;

13 said apparatus being operable to maintain its unclamped position when placed in said
14 unclamped position;

15 said apparatus being released when the at least one shoulder of the blade shank portion
16 engages said apparatus as the shank portion is inserted into said opening and slot a
17 predetermined distance to thereby place said apparatus in said clamped position;

18 said apparatus engaging the at least one shoulder and pushing the blade shank portion
19 outwardly when said mechanism is moved to said unclamped position.

20 2. A clamping apparatus as defined in claim 1 further comprising at least one spring
21 biasing said apparatus toward said clamped position.

22 3. A clamping apparatus as defined in claim 1 further comprising:

23 a releasable retaining mechanism for holding said apparatus in its unclamped position
24 when placed in said unclamped position;

25 said retaining mechanism being released when the blade shank portion is inserted into
26 said opening and slot a predetermined distance to thereby place said clamping apparatus in said
27 clamped position;

28 said clamping apparatus pushing the blade shank portion outwardly there-from when
29 said retaining mechanism is moved to said unclamped position.

1 4. A tool-less blade clamping apparatus for a reciprocating tool of the type which
2 has a reciprocating plunger with at least one radially oriented aperture and a blade receiving slot
3 at its forward end for receiving a blade of the type which has a shank portion with a hole and at
4 least one outwardly extending shoulder between the distal end of the shank and a main portion,
5 the shank being configured to be inserted in the slot, the apparatus being configured to be
6 attached to the plunger and having an opening for receiving the blade shank therein and in the
7 slot, said apparatus comprising:

8 said apparatus having an unclamped position and a clamped position wherein the shank
9 portion of the blade can be inserted into said opening when it is in said unclamped position and
10 be securely retained therein when in said clamped position;

11 at least one spring biasing said apparatus toward said clamped position;

12 a releasable retaining mechanism for holding said apparatus in its unclamped position
13 when placed in said unclamped position;

14 said retaining mechanism being released when the shoulder of the blade engages said
15 apparatus as the blade shank portion is inserted into said opening and slot a predetermined
16 distance to thereby place said clamping apparatus in said clamped position;

17 said clamping apparatus engaging the at least one shoulder and pushing the blade shank
18 portion outwardly therefrom when said retaining mechanism is moved to said unclamped
19 position.

20 5. A clamping apparatus as defined in claim 4 wherein the plunger has a cylindrical
21 end portion and said clamping apparatus further comprises:

22 a hollow generally cylindrical inner sleeve configured to fit around the plunger and
23 having structure engaging the slot so that said inner sleeve is axially movable and non-rotatable
24 relative to the plunger, and having at least one outwardly extending protrusion and an inner ramp
25 surface at its forward end that is axially oriented and inclined radially outwardly in the rearward
26 direction;

27 a hollow generally cylindrical outer sleeve configured to fit around said inner sleeve and
28 move circumferentially and axially relative thereto, said outer sleeve having a circumferentially
29 extending elongated slot with a transverse axially extending slot extension and at least one recess
30 in the inside surface thereof forming a diagonal wall that extends at least through the same arc as
31 the length of said circumferential slot and is diagonally oriented toward the front of said outer

1 sleeve from said end of said elongated slot that has said transverse extension to said opposite end
2 for contacting said protrusion therein, said recess diagonal wall causing said outer sleeve to
3 rotate relative to said inner sleeve responsive to forward axial movement of said inner sleeve;

4 a pin secured to the plunger and engaging said slot of said outer sleeve and limiting
5 rotational movement of said outer sleeve between the ends of said circumferentially extending
6 slot and axially between the ends of said transverse axially extending slot extension;

7 a compression spring having one end effectively restrained by the plunger and positioned
8 to bias said inner sleeve forwardly;

9 a detente positioned in the plunger rod aperture and configured to engage the hole in the
10 blade and thereby firmly hold the blade in said apparatus when urged into contact with the blade;

11 said inner sleeve being biased to move forwardly when the blade is inserted into the slot
12 and said inner and outer sleeves said predetermined distance, whereby said outer sleeve is
13 released to rotate relative to said inner sleeve, causing said inner sleeve to move forwardly and
14 engage said detente to move it into the hole in the blade and firmly hold the blade in the
15 apparatus;

16 the blade being ejected when the outer sleeve is manually rotated in the opposite direction
17 to its position before it was released by insertion of the blade.

18 6. A clamping apparatus as defined in claim 5 wherein said inner sleeve structure
19 comprises at least one axially oriented rib extending inwardly of the inner surface, said rib
20 engaging the slot of the plunger to thereby preclude rotation of said inner sleeve relative to said
21 plunger.

22 7. A clamping apparatus as defined in claim 5 wherein the plunger has a cylindrical
23 end portion that has a reduced diameter relative to the plunger adjacent said end portion to
24 thereby define a shoulder, said apparatus further comprising a spring retainer contacting the rear
25 end of said spring, said spring retainer contacting the plunger shoulder which limits rearward
26 movement of said spring retainer.

27 8. A clamping apparatus as defined in claim 5 wherein said detente has a generally
28 cylindrical configuration with a generally truncated conical first end for insertion in the hole and
29 a generally curved second end for being engaged by said inner sleeve.

30 9. A clamping apparatus as defined in claim 5 wherein said second end has a
31 generally hemispherically shape.

1 10. A clamping apparatus as defined in claim 5 wherein said predetermined distance
2 is the distance sufficient to align said pin in said circumferential slot so that said outer sleeve can
3 rotate relative to said inner sleeve.

4 11. A clamping apparatus as defined in claim 5 wherein said circumferential slot is
5 oriented in a plane that is substantially perpendicular to the axis of said outer sleeve.

6 12. A clamping apparatus as defined in claim 5 wherein said spring is a compression
7 spring having an inner diameter slightly larger than the diameter of the plunger end portion.

8 13. A clamping apparatus as defined in claim 5 wherein said inner sleeve has two
9 protrusions that are diametrically opposite one another and said outer sleeve has two recesses
10 defining a diagonal wall.

11 14. A clamping apparatus as defined in claim 5 wherein said diagonal recess extends
12 from the length of said wall rearwardly in the axial direction to the rear end of said outer sleeve.

13 15. A clamping apparatus as defined in claim 4 wherein the plunger has a cylindrical
14 end portion and said clamping apparatus further comprises:

15 a hollow generally cylindrical clamping collar configured to fit around the plunger and be
16 rotatable relative to the plunger, and having at least one axially oriented recess extending at least
17 part of the length thereof and an inner cam surface that begins at the inside surface thereof and
18 increases in radius through a first predetermined circumferential arc in a first direction;

19 a hollow generally cylindrical control sleeve configured to fit around said clamping
20 collar, said control being rotatable and having an inwardly directed axial rib extending at least a
21 portion of its length, said rib engaging said axial recess of said clamping collar to rotational lock
22 said clamping collar and said control sleeve together, said control sleeve having a
23 circumferentially extending elongated slot with a transverse axially extending slot extension;

24 a pin secured to the plunger and engaging said slot of said control sleeve and limiting
25 rotational movement of said control sleeve between the ends of said circumferentially extending
26 slot and axially between the ends of said transverse axially extending slot extension;

27 a torsion spring having one end restrained by the plunger and its opposite end retained by
28 said control sleeve;

29 a compression spring effectively restrained by the plunger for biasing said control sleeve
30 toward the forward direction;

1 a detente positioned in the plunger rod aperture and configured to engage the hole in the
2 blade and thereby firmly hold the blade in said apparatus when urged into contact with the blade;

3 said control sleeve being biased by said torsion spring to rotate said clamping collar when
4 the blade is inserted into the slot and said clamping collar and control sleeve said predetermined
5 distance, whereby said control sleeve is released to rotate relative to said plunger, causing said
6 clamping collar to rotate so that said cam surface engages said detente to move it into the hole in
7 the blade and firmly hold the blade in the apparatus;

8 the blade being ejected when the control sleeve is manually rotated in the opposite
9 direction to its position before it was released by insertion of the blade.

10 16 A clamping apparatus as defined in claim 15 further comprising a support ring
11 with an aperture therein positioned on the plunger end configured to contact the rear surface of
12 said control sleeve and the forward end of said compression spring.

13 17. A clamping apparatus as defined in claim 16 wherein the plunger has a cylindrical
14 end portion that has a reduced diameter relative to the plunger adjacent said end portion to
15 thereby define a shoulder, said apparatus further comprising a spring retainer contacting the rear
16 end of said compression spring, said spring retainer contacting the plunger shoulder which limits
17 rearward movement of said spring retainer.

18 18. A clamping apparatus as defined in claim 15 wherein said control sleeve has a
19 forward annular end wall with an opening therein that is slightly larger than the diameter of the
20 plunger end portion, said end wall being configured to contact the at least one shoulder of the
21 blade.

22 19. A clamping apparatus as defined in claim 15 wherein said torsion spring has an
23 axially aligned front end leg and said clamping collar has an axially oriented aperture therein
24 positioned to receive said front end leg for biasing said clamping collar in said first direction.

25 20. A clamping apparatus as defined in claim 4 wherein the plunger has a cylindrical end
26 portion and said clamping apparatus further comprises:

27 a hollow generally cylindrical control sleeve configured to fit around the plunger, said
28 control sleeve being axially movable relative to the plunger, said control sleeve having an
29 elongated axially oriented aperture therein and an annular recess oriented in a plane
30 perpendicular to the axis thereof and extending around a substantial portion of the outside

1 surface near its front, said recess merging with a transverse axially oriented recess extending in
2 the rearward direction;

3 a hollow generally cylindrical clamping collar configured to fit around said control sleeve
4 and being rotatable relative to the plunger and control sleeve, said clamping collar having an
5 inward protrusion configured to engage said annular recess and said transverse recess, said
6 clamping collar having an elongated slot extending around at least part of the circumference
7 thereof and an inner cam surface that begins at the inside surface thereof and increases in radius
8 through a first predetermined circumferential arc in a first direction;

9 a pin secured to the plunger and engaging said aperture of said control sleeve to permit
10 axial movement thereof and prevent rotation thereof, said pin being positioned in said slot of said
11 clamping collar to prevent axial movement and limit rotational movement thereof between the
12 ends of said circumferentially extending slot;

13 a torsion spring having one end restrained by the plunger and its opposite end operatively
14 connected to said control sleeve;

15 a compression spring effectively restrained by the plunger for biasing said control sleeve
16 in the forward direction;

17 a detente positioned in the plunger aperture and configured to engage the hole in the
18 blade and thereby firmly hold the blade in said apparatus when urged into contact with the blade;

19 said clamping collar being biased by said torsion spring to rotate said clamping collar
20 when the blade is inserted into said clamping collar and control sleeve said predetermined
21 distance, whereby said control sleeve is moved rearwardly until said protrusion moves from said
22 transverse recess to said annular recess, which releases said clamping collar to rotate relative to
23 said control sleeve and the plunger, causing said cam surface to engage said detente and move it
24 into the hole in the blade and firmly hold the blade in the apparatus;

25 the blade being ejected when the clamping collar is manually rotated in the opposite
26 direction to its position before it was released by insertion of the blade.

27 21. A clamping apparatus as defined in claim 20 wherein said transverse recess
28 extends to the rear end of said control sleeve.

29 22. A clamping apparatus as defined in claim 20 wherein said annular recess is in a
30 plane perpendicular to the axis of said control sleeve.

1 23. A clamping apparatus as defined in claim 20 wherein said first predetermined arc
2 is within the range of about 50 degrees to about 90 degrees.

3 24. A clamping apparatus as defined in claim 20 further comprising a support ring
4 with an aperture therein positioned on the plunger end portion configured to contact the rear
5 surface of said clamping collar, said support ring being coupled to said clamping collar so that
6 they rotate together, said torsion spring having an axially oriented front end leg that is inserted
7 into said support ring aperture.

8 25. A clamping apparatus as defined in claim 20 wherein the plunger has a cylindrical
9 end portion that has a reduced diameter relative to the plunger adjacent said end portion to
10 thereby define a shoulder, said apparatus further comprising a spring retainer contacting the rear
11 end of said compression spring, said spring retainer contacting the plunger shoulder which limits
12 rearward movement of said spring retainer, said compression spring biasing said control sleeve
13 in the forward direction.